

## **CANAL CREEK STUDY AREA**

**Remedial Investigation Report for Thirty-Five  
Remaining Soils Sites**

**Volume IV: Kings Creek Industrial Area**

**Working Draft, January 2007**

**U.S. Army Garrison  
Aberdeen Proving Ground, Maryland**

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## **WORKING DRAFT**

### **Remedial Investigation Report for Thirty-Five Remaining Soils Sites**

#### **Volume IV: Kings Creek Industrial Area**

##### **Prepared For:**

**US Army Garrison Aberdeen Proving Ground  
Directorate of Safety, Health, and Environment  
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##### **Prepared By:**



**General Physics Corporation  
500 Edgewood Road  
Edgewood, Maryland 21040**

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#### ACRONYMS AND ABBREVIATIONS (CONTINUED)

GPS	Global Positioning System
HD	Mustard (blister agent)
HHRA	Human Health Risk Assessment
HMF	Hazardous Material Facility
ICF/IT	ICF Kaiser Engineers/IT Corporation (now Shaw Environmental, Inc.)
IRP	Installation Restoration Program
JEG	Jacobs Engineering Group, Inc.
KCIA	Kings Creek Industrial Area
LUC	Land-Use Control
MDE	Maryland Department of the Environment
msl	mean sea level
MIA-E	Main Industrial Area – East
MIA-NW	Main Industrial Area – Northwest
MIA-SW	Main Industrial Area – Southwest
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
NFA	No Further Action
No. (#)	Number
OCDD	Octochlorodibenzodioxin
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
QA/QC	Quality Assurance/Quality Control
R&D	Research and Development
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SEP	Sequential Extraction Procedure
SLERA	Screening-Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound



## ACRONYMS AND ABBREVIATIONS

AEDB-R	Army Environmental Database – Restoration
ANL	Argonne National Laboratory
APG	U.S. Army Garrison Aberdeen Proving Ground
APG-EA	Aberdeen Proving Ground, Edgewood Area
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BRAPF	Baseline Risk Assessment Problem Formulations
BTAG	Biological Technical Assistance Group
CADP	Chemical Warfare Agent Degradation Product
CCA	Canal Creek Aquifer
CCSA	Canal Creek Study Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminant of Potential Concern
CS	o-Chlorobenzylidene Malononitrile (tear-producing compound)
DDD	4,4'-dichlorodiphenyldichloroethane (pesticide compound)
DDE	4,4'-dichlorodiphenyldichloroethylene (pesticide compound)
DDT	4,4'-dichlorodiphenyltrichloroethane (pesticide compound)
DDTr	DDT and its primary degradation products DDD and DDE
DERC	Data Evaluation and Risk Characterization
DPT	Direct Push Technology
DSERTS	Defense Site Environmental Restoration Tracking System
DSHE	Directorate of Safety, Health and Environment
EA	Engineering, Science, and Technology, Inc.
ECCA	East Canal Creek Area
EcoSSL	Ecological Soil Screening Level
ECRD	Environmental Conservation and Restoration Division
EM	Electromagnetic
EOD	Explosive-Ordnance Disposal
ERA	Ecological Risk Assessment
FAWQC	Federal Ambient Water Quality Criteria
FFA	Federal Facilities Agreement
ft	Feet/foot
GB	Sarin (nerve agent)
GD	Soman (nerve agent)
GIS	Geographic Information System
GP	General Physics Corporation



## ACRONYMS AND ABBREVIATIONS (CONTINUED)

GPS	Global Positioning System
HD	Mustard (blister agent)
HHRA	Human Health Risk Assessment
HMF	Hazardous Material Facility
ICF/IT	ICF Kaiser Engineers/IT Corporation (now Shaw Environmental, Inc.)
IRP	Installation Restoration Program
JEG	Jacobs Engineering Group, Inc.
KCIA	Kings Creek Industrial Area
LUC	Land-Use Control
MDE	Maryland Department of the Environment
msl	mean sea level
MIA-E	Main Industrial Area – East
MIA-NW	Main Industrial Area – Northwest
MIA-SW	Main Industrial Area – Southwest
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
NFA	No Further Action
No. (#)	Number
OCDD	Octochlorodibenzodioxin
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
QA/QC	Quality Assurance/Quality Control
R&D	Research and Development
RAGS	Risk Assessment Guidance for Superfund
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ROD	Record of Decision
SEP	Sequential Extraction Procedure
SLERA	Screening-Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound



**ACRONYMS AND ABBREVIATIONS (CONTINUED)**

SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCPU	N,N'-bis(2,4,6-trichlorophenyl)urea
TRV	Toxicity Reference Value
UPL	Upper Prediction Limit
USACE	US Army Corps of Engineers
USAEHA	US Army Environmental Hygiene Agency
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
VX	o-ethyl s-[2-(diisoproylamino)ethyl] methylphosphonothiolate (nerve agent)
WCCA	West Canal Creek Area
WP	White Phosphorus
WWI	World War I
WWII	World War II
XRF	X-Ray Fluorescence



## EXECUTIVE SUMMARY

To date, seventeen sites within the Canal Creek Study Area (CCSA) of Aberdeen Proving Ground (APG), Maryland, have been closed out under Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Records of Decision (RODs). Approximately thirty-nine sites remain open under on-going CERCLA investigations. The four largest of the remaining sites are being addressed under individual Remedial Investigation/Feasibility Study (RI/FS) tasks: EACC1K – Canal Creek Marsh and Landfill, EACC4A-B – West Canal Creek Area – Canal Creek Aquifer (CCA), EACC5A – Canal Creek Sediments, and EACC5B – Kings Creek Sediments. This draft Remedial Investigation (RI) report is the last installment of four volumes that will address the thirty-five remaining CCSA soils sites. For the purposes of the risk assessments and RI, these sites have been divided into four regions (Figure ES-1). This volume presents the site background, technical approach, and results of environmental investigations completed for the fifteen sites within the Kings Creek Industrial Area (KCIA):

- EACC3A – Building E3330 Laboratory Toxic Waste Disposal Pits
- EACC3C – Building E32XX, E3100, E3081 Medical Research Laboratories
- EACC3D – Building E3160 Complex
- EACC3E – Building E3300 Laboratory Complex
- EACC3F – Building E35XX Area
- EACC3G – Building E360X, E361X, E362X Area
- EACC3I – Building E3570 Assembly Plant
- EACC3J – Building E3580 Pyrotechnic Loading Facility
- EACC3K-A – Building E3700 Complex
- EACC3K-B – B-Field Kings Creek Dump Site
- EACC3L – Building E3640 Process Laboratory
- EACC3M-A – Wastewater Treatment Plant
- EACC3N – Beach Point Test Site
- EACC3O – B-Field Range
- EACC3P – Mosquito Test Grid Area

These sites include former research and development areas, medical laboratories, fabrication/assembly facilities, test sites, and suspected disposal areas. Current and future land



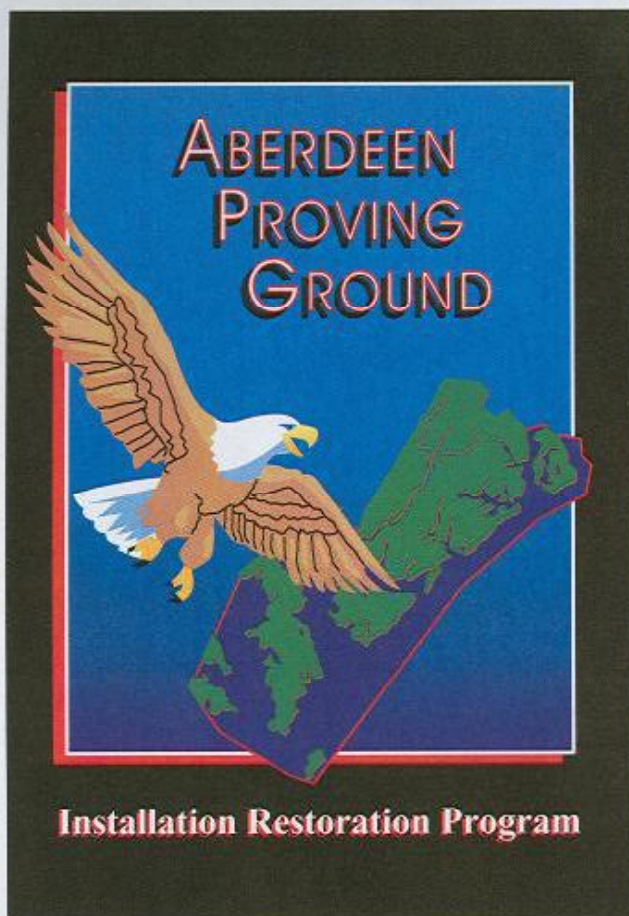
use is industrial. The three other regions of the CCSA were addressed in separate RI volumes (to be consistent with the risk assessment documents and to facilitate the stakeholder review process). Later, the four draft reports will be combined and published as one final RI document.

Over the past ten years, significant soil and sediment sampling has been conducted throughout the CCSA. Within the KCIA Region, arsenic, lead, mercury, dieldrin, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs) were the only chemicals detected in excess of US Environmental Protection Agency (USEPA) Industrial Soil Risk-Based Concentrations (RBCs). Arsenic concentrations were detected above industrial soil RBCs at all fifteen of the KCIA sites in surface and subsurface soil. During Phase I sampling at three of the sites (EACC3C, EACC3K-A, and EACC3N) the PAH compound benzo[a]pyrene was detected above industrial soil RBCs. Site EACC3C also had detections of benzo[a]anthracene and dibenz[a,h]anthracene above industrial soil RBCs. These compounds were detected during later rounds of RI sampling, but at much lower concentrations. The pesticide dieldrin was detected above the industrial soil RBC and BTAG screening level at EACC3L during Phase I sampling. Dieldrin was not detected in Phase II sampling at EACC3L, but it was detected during Phase III at much lower concentrations. The highest concentrations of PCBs were also detected at site EACC3L during Phases I and II.

Lead was detected above the USEPA lead guidance value for industrial soil, the Biological Technical Assistance Group (BTAG) screening level, and reference background at site EACC3C during Phase I and Phase II sampling. The concentration was higher in the Phase II sample. Mercury was detected above the USEPA mercury guidance value for industrial soil, the BTAG screening level, and reference background at site EACC3C during Phase I and Phase II sampling. The concentration was higher in the Phase II sample. Other metals and organic compounds exceeded background (either naturally-occurring or established anthropogenic values) and/or BTAG screening levels, but were below industrial soil RBCs.

Metal-, PAH-, pesticide- and PCB-contamination tends to be fairly localized at the CCSA KCIA sites because these chemicals bind strongly to soil rather than leaching into groundwater. Arsenic has been detected consistently throughout the KCIA sites in surface and subsurface soil. The transport of arsenic compounds is generally due to erosion of particles, including soil, and sediment containing clays, iron oxides, aluminum hydroxides, manganese compounds, and organic material with sorbed arsenic. Most PAHs occur naturally and tend to be persistent in the environment. Pesticides are typically persistent in the environment and degrade slowly. Locations of pesticide detections in soil/sediment are typical of point sources and not likely due to historical activities other than grounds maintenance. PCB compounds (e.g., Aroclor 1248 and Aroclor 1260) demonstrate strong absorption to soil and sediment media indicating that significant leaching to groundwater should not occur. However, PCB compounds may leach into





## **CANAL CREEK STUDY AREA**

**Remedial Investigation Report for Thirty-Five  
Remaining Soils Sites**

**Volume IV: Kings Creek Industrial Area**

**Working Draft, January 2007**

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**U.S. Army Garrison  
Aberdeen Proving Ground, Maryland**

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# **CANAL CREEK STUDY AREA**

## **WORKING DRAFT**

### **Remedial Investigation Report for Thirty-Five Remaining Soils Sites**

#### **Volume IV: Kings Creek Industrial Area**

##### **Prepared For:**

**US Army Garrison Aberdeen Proving Ground  
Directorate of Safety, Health, and Environment  
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**General Physics Corporation  
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## ACRONYMS AND ABBREVIATIONS

AEDB-R	Army Environmental Database – Restoration
ANL	Argonne National Laboratory
APG	U.S. Army Garrison Aberdeen Proving Ground
APG-EA	Aberdeen Proving Ground, Edgewood Area
ATSDR	Agency for Toxic Substances and Disease Registry
bgs	below ground surface
BRAPF	Baseline Risk Assessment Problem Formulations
BTAG	Biological Technical Assistance Group
CADP	Chemical Warfare Agent Degradation Product
CCA	Canal Creek Aquifer
CCSA	Canal Creek Study Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COPC	Contaminant of Potential Concern
CS	o-Chlorobenzylidene Malononitrile (tear-producing compound)
DDD	4,4'-dichlorodiphenyldichloroethane (pesticide compound)
DDE	4,4'-dichlorodiphenyldichloroethylene (pesticide compound)
DDT	4,4'-dichlorodiphenyltrichloroethane (pesticide compound)
DDTr	DDT and its primary degradation products DDD and DDE
DERC	Data Evaluation and Risk Characterization
DPT	Direct Push Technology
DSERTS	Defense Site Environmental Restoration Tracking System
DSHE	Directorate of Safety, Health and Environment
EA	Engineering, Science, and Technology, Inc.
ECCA	East Canal Creek Area
EcoSSL	Ecological Soil Screening Level
ECRD	Environmental Conservation and Restoration Division
EM	Electromagnetic
EOD	Explosive-Ordnance Disposal
ERA	Ecological Risk Assessment
FAWQC	Federal Ambient Water Quality Criteria
FFA	Federal Facilities Agreement
ft	Feet/foot
GB	Sarin (nerve agent)
GD	Soman (nerve agent)
GIS	Geographic Information System
GP	General Physics Corporation



#### ACRONYMS AND ABBREVIATIONS (CONTINUED)

GPS	Global Positioning System
HD	Mustard (blister agent)
HHRA	Human Health Risk Assessment
HMF	Hazardous Material Facility
ICF/IT	ICF Kaiser Engineers/IT Corporation (now Shaw Environmental, Inc.)
IRP	Installation Restoration Program
JEG	Jacobs Engineering Group, Inc.
KCIA	Kings Creek Industrial Area
LUC	Land-Use Control
MDE	Maryland Department of the Environment
msl	mean sea level
MIA-E	Main Industrial Area – East
MIA-NW	Main Industrial Area – Northwest
MIA-SW	Main Industrial Area – Southwest
mg/kg	milligrams per kilogram
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
NFA	No Further Action
No. (#)	Number
OCDD	Octochlorodibenzodioxin
PAH	Polycyclic Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
QA/QC	Quality Assurance/Quality Control
R&D	Research and Development
RAGS	Risk Assessment Guidance for Superfund
RBC	Risk-Based Concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SEP	Sequential Extraction Procedure
SLERA	Screening-Level Ecological Risk Assessment
SOP	Standard Operating Procedure
SVOC	Semivolatile Organic Compound



#### ACRONYMS AND ABBREVIATIONS (CONTINUED)

SWMU	Solid Waste Management Unit
TAL	Target Analyte List
TCE	Trichloroethene
TCL	Target Compound List
TCPU	N,N'-bis(2,4,6-trichlorophenyl)urea
TRV	Toxicity Reference Value
UPL	Upper Prediction Limit
USACE	US Army Corps of Engineers
USAEHA	US Army Environmental Hygiene Agency
USEPA	US Environmental Protection Agency
USGS	US Geological Survey
UXO	Unexploded Ordnance
VOC	Volatile Organic Compound
VX	o-ethyl s-[2-(diisoproylamino)ethyl] methylphosphonothiolate (nerve agent)
WCCA	West Canal Creek Area
WP	White Phosphorus
WWI	World War I
WWII	World War II
XRF	X-Ray Fluorescence



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